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Conference Abstract

Building Networks to Promote Knowledge of Brazil's Biodiversity: The experience of the INCT - Virtual Herbarium

Maria Regina de V. Barbosa[‡], Ana Odete Vieira[§], Ariane L Peixoto[|], Dora Ann Lange Canhos[¶], João R Stehmann[#], Mariângela Menezes[¤], Leonor C Maia[«]

‡ Universidade Federal da Paraíba, João Pessoa, Brazil
§ Universidade Estadual de Londrina, Londrina, Brazil
| Jardim Botânico do Rio de Janeiro, Rio de Janeiro, Brazil
¶ Centro de Referência em Informação Ambiental (CRIA), Campinas, Brazil
# Universidade Federal de Minas Gerais, Belo Horizonte, Brazil
¤ Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
« Universidade Federal de Pernambuco, Recife, Brazil

Corresponding author: Maria Regina de V. Barbosa (mregina@dse.ufpb.br)

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Abstract

The Botanical Society of Brazil (SBB) for many years discussed the need to improve the nation's herbarium collections, by providing training and educating botanists as specialists in plant and fungal taxonomy. It was in this context that an audacious project was developed, which envisaged personnel training for studies in plant and fungal diversity (particularly taxonomy and curation of collections) and the organization and online delivery of the label data of plant and fungal specimens from the herbaria of Brazil - the National Institute of Science and Technology (INCT) Virtual Herbarium.

The INCT-Virtual Herbarium had the benefit of the expertise from existing initiatives which, when brought together, made its development possible within a short period of time. These initiatives included: the Herbaria Network of SBB; the Herbarium Network of the Northeast; the Brazilian National Research and Education Network (RNP); and the Reference Center for Environmental Information (CRIA), responsible for the development and maintenance of

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the *species*Link Network. When it began in 2009, the INCT-Virtual Herbarium brought together 25 Brazilian herbaria sharing 48 plant and fungal databases online (one herbarium can share more than one data set, e.g., plants, fungi, carpological collection), and two US herbaria. Today, the network includes 140 Brazilian herbaria and 25 herbaria from other countries, which hold collections originating from Brazil, thus creating a national virtual herbarium with 190 data sets, sharing over 11 million data records and over 4.5 million associated images.

The INCT-Virtual Herbarium is not only a data aggregator, but also an active and integrated community with common objectives such as: free sharing of good quality data; fomenting the important role of herbaria in documenting knowledge of the flora and funga, training, and developing tools and systems to improve data quality and in identifying data and knowledge gaps to help plan new collecting expeditions.

The INCT-Virtual Herbarium chose to adopt a collegiate management model, led by a Management Committee of six members from different institutions, together with coordinators of the following subject areas: flowering plant taxonomy, taxonomy of cryptogams, personnel training, liaison with herbaria, product research, and online information systems. A variety of indicators and applications were developed to make online monitoring of activities viable and these are all freely available to anyone interested. Not only the Management Committee but also each partner herbarium can follow the evolution of the INCT, as well as that of each herbarium, in qualitative and quantitative terms.

Besides the scientific community, the INCT reaches the general public and decision-makers, providing information that has improved the understanding of preservation and conservation of Brazil's biological heritage, represented by the botanical and mycological collections. The INCT Virtual Herbarium adopted the *species*Link platform as the basis for its information system. This platform began its development in 2001 with support from the São Paulo Research Foundation (FAPESP), and in 2008 was the only network in Brazil with national scope and international recognition.

Some initial decisions on the architecture of the network, which would serve the INCT-Virtual Herbarium were fundamental to its success: the use of international standards and protocols; the concept of minimum interference with the collections, where each data provider could retain sensitive data, having full control of its data; the acceptance of the data without a quality filter, as the network has important tools to identify errors; any changes or corrections are made only by those responsible for the curation of the data; recognition and credit awarded to each and every participant.

The *species*Link network uses the Darwin Core data standard (Wieczorek et al. 2012) and participated actively with the Global Biodiversity Information Facility (GBIF) and other networks in developing the DiGIR protocol (Distributed Generic Information Retrieval) and its later evolution the TAPIR protocol (TDWG Access Protocol for Information Retrieval). The use of these standards and protocols facilitated the process of repatriating collection data of Brazilian material deposited in herbaria in other countries.

In 2015 the INCT Virtual Herbarium started to transfer its data sets to GBIF and SiBBr, the Brazilian Biodiversity Information System and the Brazilian node of GBIF. These data sets are updated every month, but their updating in SiBBr and GBIF depends on indexing actions of these networks. The development of the INCT-Virtual Herbarium network has shown that a large community of widely dispersed scientists can work together around an important objective, providing Brazil's biodiversity data, and benefiting the whole community.

Keywords

data sharing, network building capacity, plant and fungal databases

Presenting author

Maria Regina de V. Barbosa

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